IEEE 802.11

WIRELESS ACCESS METHODS AND PHYSICAL LAYER SPECIFICATIONS

Title : **DBPSK compatible power efficient NLA technique (1 watt) for DS-SS**

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ABSTRACT

A fully compatible power efficient solution with the adopted DBPSK, DQPSK, and OQPSK modulation standard for DS-SS IEEE 802.11 is proposed. This highly power efficient nonlinearly amplified (NLA) type of DBPSK is fully interoperable and compatible with the already standardized DBPSK, DQPSK, and O-QPSK as well as FQPSK without any need for hardware modifications. This NLA BPSK system can attain 1 watt transmit power instead 150 mWatt for the linearly amplified comparable conventional DBPSK. A nonlinear amplified O-QPSK technique for the 2 Mbits specifications DSS-SS is described by Wan (Ref. 20).

INTRODUCTION

To transmit in the authorized FCC spectrum, and to attain (1Watt) transmit power at 2.4 GHz within a PCMCIA card, it may be essential to use nonlinear (NLA) or C class type of amplifiers (Ref. 1-6). This improved power efficient DBPSK becomes an important choice for such applications. The increase of power efficiency is based on the O-QPSK modulator structure and in particular the constant envelope property of the O-QPSK compatible NLA modulation (Ref. 7-

14) where simple baseband processing called FQPSK is employed. The modulator structure of this nonlinear amplified improved DBPSK is shown in figure 1.0 . The input data to the quadrature modulator structure is simply converted to I and Q channels with the intention that all *Input data* , *I channel* and *Q channel* have same data. The I and Q channels are then processed with a baseband processor before being modulated, combined, and nonlinearly amplified.

The received signal can be demodulated using any conventional DBPSK demodulation technique.

ANALYSIS

This improved power efficient nonlinear amplified BPSK modulator has been evaluated in hard limited channels, and does meet the FCC Mask specifications for DS-SS IEEE 802.11 standard (Ref. 15-19) for 1Mbits/s transmission. The spectrum of this NLA- BPSK is shown in figure 2.0, along with the regular BPSK spectrum in hard limited channels. The improved PSD can also translate to a lower ACI interference, thus improve spectral efficiency which in turn increase system capacity.

Illustrative BER performance of this NLA BPSK is shown in figure 3.0, we see that there only a small degradation when we compare with theoretical linearly amplified BPSK in both AWGN and Rayleigh fading channels.

CONCLUSION

An improved power efficient nonlinear amplified DBPSK is presented. The above modulation is fully interoperable with the adopted conventional DBPSK, DQPSK, and O-QPSK modulation standard for DS-SS IEEE 802.11. Its use of the quadrature structure of the adopted modulations and the constant envelope characteristics of fully compatible O-QPSK systems(Ref. 7-14) lead power efficient system of 1 watt transmit power that is nonlinear amplified compare to the conventional 150 mWatt BPSK linear amplified systems.

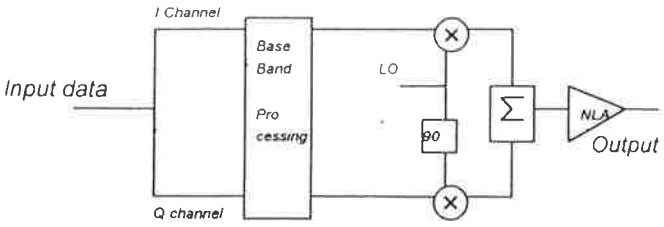


Figure 1.0, A DBPSK compatible , power efficient NLA Modulator for DS-SS IEEE 802.11

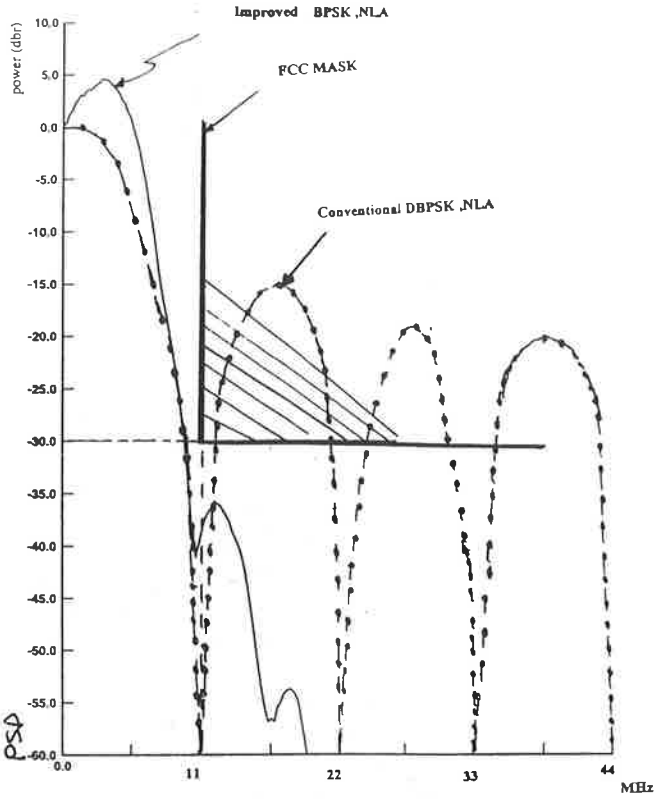


Figure 2.0 Illustrative Power spectral density in a hardlimited channel

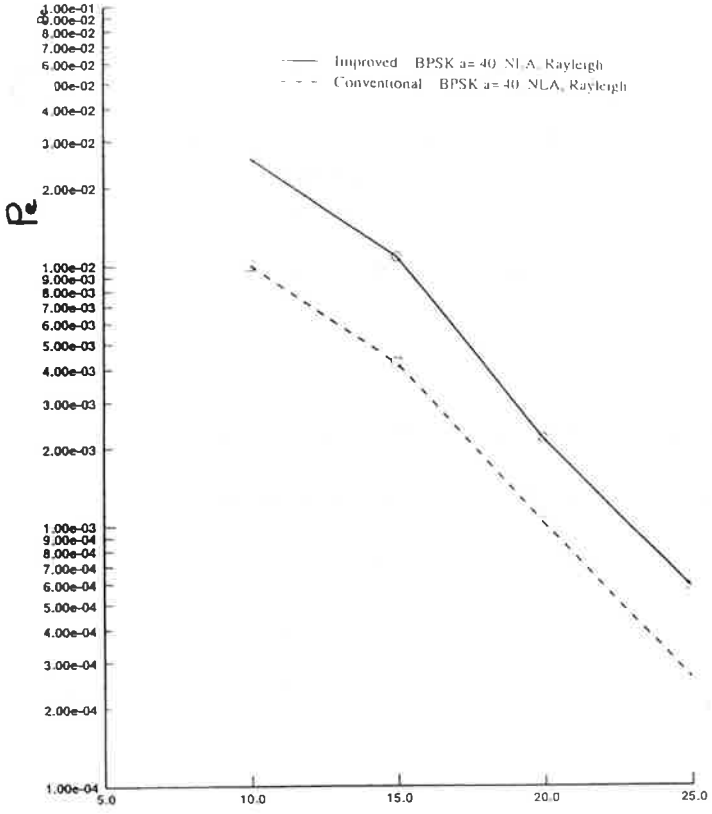
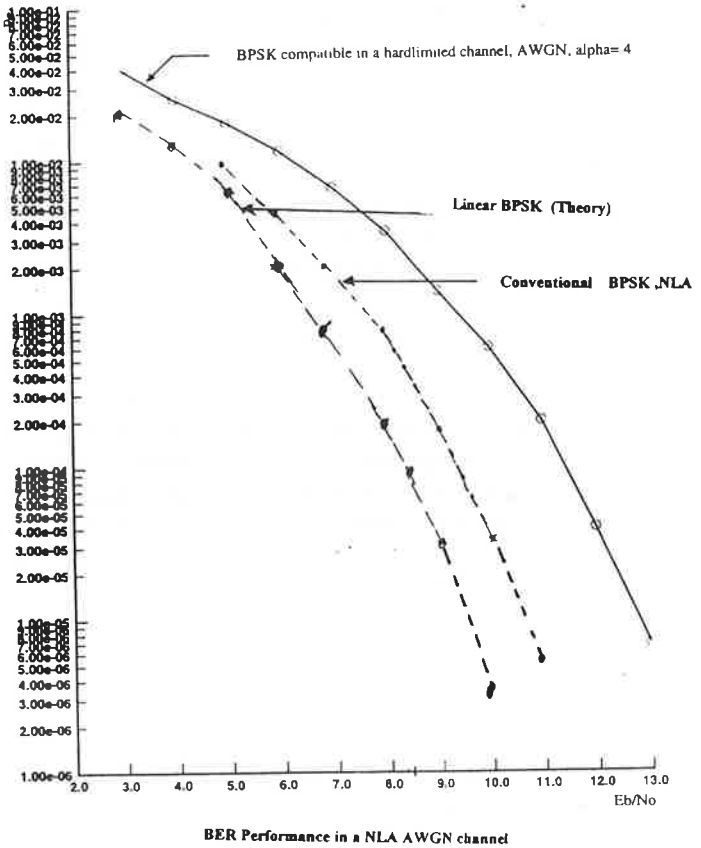


Figure 3.a BER performance in Rayleigh Fading Nonlinear channel



BER Performance in a NLA AWGN channel

Figure 3.0 BER for conventional and Improved BPSK in AWGN/Ray channel

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